Chapter Study Guide

1 Earth in Space

Key Concepts

- Earth moves through space in two major ways: rotation and revolution.
- Earth has seasons because its axis is tilted as it revolves around the sun.

Key Terms

astronomy
rotation
orbit
solstice
axis
revolution
calendar
equinox

2 Gravity and Motion

Key Concepts

- The strength of the force of gravity between two objects depends on two factors: the masses of the objects and the distance between them.
- Newton concluded that two factors—inertia and gravity—combine to keep Earth in orbit around the sun and the moon in orbit around Earth.

Key Terms

force
gravity
law of universal gravitation
mass
weight
inertia
Newton's first law of motion

3 Phases, Eclipses, and Tides

Key Concepts

- The changing relative positions of the moon, Earth, and sun cause the phases of the moon, eclipses, and tides.
- The phase of the moon you see depends on how much of the sunlit side of the moon faces Earth.
- When the moon's shadow hits Earth or Earth's shadow hits the moon, an eclipse occurs.
- A solar eclipse occurs when the moon passes directly between Earth and the sun, blocking sunlight from Earth.
- During a lunar eclipse, Earth blocks sunlight from reaching the moon.
- Tides are caused mainly by differences in how much the moon's gravity pulls on different parts of Earth.

Key Terms

phases
solar eclipse
penumbra
tide
neap tide
eclipse
umbra
lunar eclipse
spring tide

4 Earth's Moon

Key Concepts

- Features on the moon's surface include maria, craters, and highlands.
- The moon is dry and airless. Compared to Earth, the moon is small and has large variations in its surface temperature.
- Scientists theorize that a planet-sized object collided with Earth to form the moon.

Key Terms

telescope
maria
craters
meteoroids

Review and Assessment

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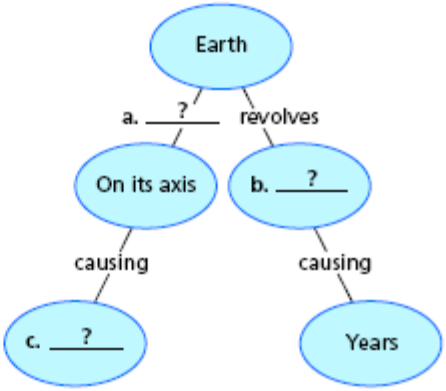
Organizing Information

Concept Mapping Copy the concept map about how Earth moves in space onto a separate sheet of paper. Then complete it and add a title. (For more on Concept Mapping, see the Skills Handbook.)



Reviewing Key Terms

Choose the letter of the best answer.

1. The movement of Earth around the sun once a year is called Earth's
   a. inertia. **b.** rotation.
   c. revolution. **d.** axis.
2. A day when the sun reaches its greatest distance north or south of the equator is called a(an)
   a. umbra.
   b. penumbra.
   c. equinox.
   d. solstice.
3. The tendency of an object to resist a change in motion is called
   a. gravity.
   b. inertia.
   c. force.
   d. the law of universal gravitation.
4. When Earth's shadow falls on the moon, the shadow causes a
   a. new moon.
   b. solar eclipse.
   c. full moon.
   d. lunar eclipse.
5. The craters on the moon were caused by
   a. tides. **b.** volcanoes.
   c. meteoroids. **d.** maria.

If the statement is true, write *true*. If it is false, change the underlined word or words to make the statement true.

6. Earth's spinning on its axis is called <u>rotation</u>.
7. The force that attracts all objects toward each other is called <u>inertia</u>.
8. The tilt of Earth's axis as Earth revolves around the sun causes <u>eclipses</u>.
9. The amount of matter in an object is its <u>weight</u>.
10. The greatest difference between low and high tides occurs during a <u>neap</u> tide.

Writing in Science

News Report Imagine that you are a reporter asked to write a story about the origin of the moon. Write an article explaining how the moon formed.

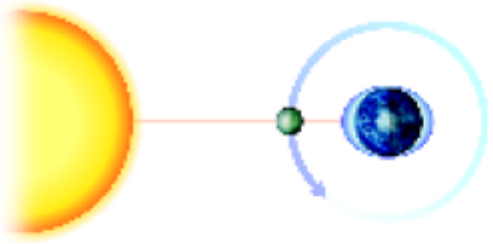
Discovery Channel School

Earth, Moon, and Sun
Video Preview
Video Field Trip
▶ Video Assessment

Review and Assessment

Checking Concepts

11. Explain how the length of the day and year are related to Earth's movement through space.
12. Suppose you moved two objects farther apart. How would this affect the force of gravity between those objects?
13. Explain Newton's first law of motion in your own words.
14. Why does the moon have phases?
15. Why do more people see a total lunar eclipse than a total solar eclipse?
16. Why is there a high tide on the side of Earth closest to the moon? On the side of Earth farthest from the moon?
17. Does the diagram below show a spring tide or a neap tide? How do you know?



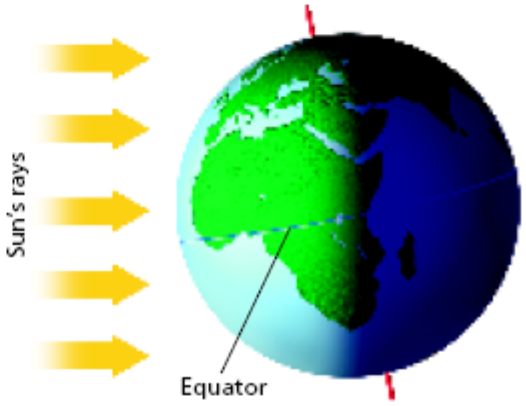
18. How did the invention of the telescope contribute to our knowledge of the moon's surface?
19. Why do temperatures vary so much on the moon?
20. Explain how scientists think the moon originated.

Thinking Critically

21. **Inferring** Mars's axis is tilted at about the same angle as Earth's axis. Do you think Mars has seasons? Explain your answer.
22. **Comparing and Contrasting** How are mass and weight different?
23. **Calculating** Suppose a person weighs 450 newtons (about 100 pounds) on Earth. How much would she weigh on the moon?
24. **Applying Concepts** At about what time does the full moon rise? Is it visible in the eastern sky or the western sky?
25. **Posing Questions** Suppose you were assigned to design a spacesuit for astronauts to wear on the moon. What characteristics of the moon would be important to consider in your design?

Applying Skills

Use the illustration below to answer Questions 26–28.



26. **Interpreting Diagrams** On which hemisphere are the sun's rays falling most directly?
27. **Inferring** In the Northern Hemisphere, is it the summer solstice, winter solstice, or one of the equinoxes? How do you know?
28. **Predicting** Six months after this illustration, Earth will have revolved halfway around the sun. Draw a diagram that shows which end of Earth's axis will be tilted toward the sun.

Lab zone Chapter Project

Performance Assessment Present your observation log, map, and drawings of the moon. Some ways to graph your data include time of moonrise for each date; how often you saw the moon in each direction; or how often you saw the moon at a specific time. Display your graphs. Discuss any patterns that you discovered.

Standardized Test Prep

Test-Taking Tip

Interpreting a Diagram

When answering questions about diagrams, examine the diagram carefully, including labels. For example, the numbers on the diagram shown above Question 5 indicate the locations of the moon in its orbit around Earth. Study the diagram and answer the sample question below.

Sample Question

When the moon is in location 3, a person standing on Earth at night would see

- **A** a full moon.
- **B** a crescent moon.
- **C** a quarter moon.
- **D** a new moon.

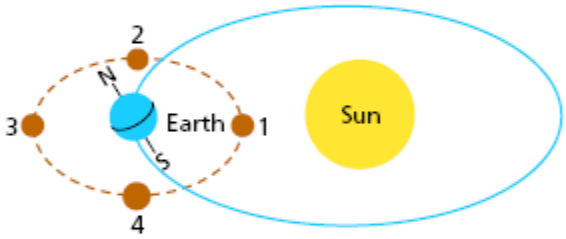
Answer

The correct answer is **A**. The diagram shows that when the moon is at location 3, Earth is between the moon and the sun. Therefore, the sun lights the entire side of the moon facing Earth.

Choose the letter of the best answer.

1. You observe a thin crescent moon in the western sky during the early evening. About two weeks later, a full moon is visible in the eastern sky during the early evening. Which conclusion is best supported by these observations?
   - **A** The moon revolves around Earth.
   - **B** The moon rotates on its axis.
   - **C** Earth revolves around the sun.
   - **D** Earth's axis is tilted relative to the moon.
2. Only one side of the moon is visible from Earth because
   - **F** the moon does not rotate on its axis.
   - **G** the moon does not revolve around Earth.
   - **H** the moon rotates faster than it revolves.
   - **J** the moon revolves once and rotates once in the same period of time.
3. What type of eclipse occurs when Earth's umbra covers the moon?
   - **A** a partial solar eclipse
   - **B** a total solar eclipse
   - **C** a partial lunar eclipse
   - **D** a total lunar eclipse
4. The force of gravity depends on
   - **F** mass and weight.
   - **G** speed and distance.
   - **H** mass and distance.
   - **J** weight and speed.

The diagram below shows the relative positions of the sun, moon, and Earth. The numbers indicate specific locations of the moon in its orbit. Use the diagram to answer Questions 5 and 6.



5. Which of the following can occur when the moon is at location 1?
   - **A** only a lunar eclipse
   - **B** only a solar eclipse
   - **C** both a solar and a lunar eclipse
   - **D** neither a solar nor a lunar eclipse
6. When the moon is at location 2, at most coastal locations there would be
   - **F** only one high tide each day.
   - **G** only one low tide each day.
   - **H** two high tides and two low tides each day, with the most difference between high and low tide.
   - **J** two high tides and two low tides each day, with the least difference between high and low tide.

Constructed Response

7. The sun rises on the east coast of the United States before it rises on the west coast of the United States. Explain why this happens.